

What is claimed is:

1 1. An angled tissue cutting instrument comprising
2 an elongate angled outer tubular member comprising a distal end, a proximal
3 end, a bend between said distal end and said proximal end, and an opening at said
4 distal end defining a cutting port; and
5 an elongate flexible inner tubular member rotatably disposed in said outer tubular
6 member and comprising a distal end, a proximal end, an elongate tubular body
7 between said distal end of said inner tubular member and said proximal end of said
8 inner tubular member, a cutting configuration at said distal end of said inner tubular
9 member for exposure by said cutting port to cut anatomical tissue when said inner
10 tubular member is rotated within said outer tubular member, a flexible region along said
11 body disposed in said bend to transmit torque to said cutting configuration when said
12 inner tubular member is rotated in forward and reverse rotational directions, said flexible
13 region comprising a continuous helical cut formed along a length portion of said body
14 corresponding to said bend, a coating of adhesive disposed over an outer surface of
15 said body along said length portion, and a heat shrunk sleeve disposed over said length
16 portion with a close diametric fit, with said adhesive bonding said sleeve to said outer
17 surface of said body along said length portion.

1 2. The angled tissue cutting instrument recited in claim 1 wherein said helical
2 cut is formed through the wall thickness of said body at a helix angle in a first direction
3 about a central longitudinal axis of said flexible inner tubular member.

1 3. The angled tissue cutting instrument recited in claim 2 wherein said helix
2 angle is about 20° and said first direction is a left hand direction about said central
3 longitudinal axis of said inner tubular member.

1 4. The angled tissue cutting instrument recited in claim 2 wherein said helical
2 cut is formed in a stepped pattern comprising repeating interconnected steps.

1 5. The angled tissue cutting instrument recited in claim 4 wherein each step
2 repeats at rotational intervals of about 120° about said central longitudinal axis of said
3 inner tubular member.

1 6. The angled tissue cutting instrument recited in claim 4 wherein each of
2 said steps comprises a transverse cut segment extending transverse to the length of
3 said body at said helix angle to a plane perpendicular to said central longitudinal axis of
4 said inner tubular member and a longitudinal cut segment extending from said
5 transverse cut segment along the length of said body.

1 7. The angled tissue cutting instrument recited in claim 1 wherein said
2 adhesive comprises a spray adhesive.

1 8. The angled tissue cutting instrument recited in claim 1 wherein said
2 sleeve is made of fluorinated ethylene propylene.

1 9. The angled tissue cutting instrument recited in claim 8 wherein said
2 sleeve has a thickness of about .010 inch and a shrink ratio of about 1.3 to1.

1 10. An angled tissue cutting instrument comprising
2 an elongate angled outer tubular member comprising a distal end, a proximal
3 end, a bend between said distal end and said proximal end, and an opening in said
4 distal end defining a cutting port; and
5 an elongate flexible inner tubular member rotatably disposed in said outer tubular
6 member and comprising a distal end, a proximal end, an elongate tubular body
7 between said distal end and said proximal end of said inner tubular member, a cutting
8 configuration at said distal end of said inner tubular member for exposure by said
9 cutting port to cut anatomical tissue when said inner tubular member is rotated within
10 said outer tubular member, and a flexible region along said body disposed within said
11 bend, said flexible region comprising an outer wall along an outer diameter surface of
12 said inner tubular member and an inner wall along an inner diameter surface of said
13 inner tubular member, said outer wall being secured to said inner wall, said inner wall
14 comprising a helically cut length portion of said body having a cut through the wall
15 thickness of said body extending helically along said length portion, said outer wall
16 comprising a continuous solid flexible surface covering said helically cut length portion.

1 11. The angled tissue cutting instrument recited in claim 10 wherein said
2 flexible surface is adhesively secured to an outer surface of said body.

1 12. The angled tissue cutting instrument recited in claim 10 wherein said
2 flexible surface comprises a heat shrunk sleeve receiving said helically cut length
3 portion therein.

1 13. The angled tissue cutting instrument recited in claim 10 wherein said cut
2 is formed through said wall thickness of said body in a stepped pattern.

1 14. The angled tissue cutting instrument recited in claim 10 wherein said outer
2 tubular member has a lumen receiving said inner tubular member and further
3 comprising an aspiration port in said distal end of said inner tubular member and an
4 aspiration passage through said body in communication with said aspiration port,
5 wherein said flexible surface prevents communication between said aspiration passage
6 and said lumen along said flexible region.

1 15. The angled tissue cutting instrument recited in claim 10 wherein said outer
2 tubular member has a lumen in communication with said cutting port, said inner tubular
3 member is received in said lumen, said lumen defines an irrigation channel for receiving
4 irrigating fluid between said outer tubular member and said inner tubular member for
5 discharge through said cutting port, said body has a lumen, wherein said flexible
6 surface prevents communication between said lumen of said body and said irrigation
7 channel along said flexible region.

1 16. The angled tissue cutting instrument recited in claim 10 wherein said outer
2 tubular member includes a plurality of said bends and said inner tubular member
3 includes a plurality of said flexible regions disposed within said bends, respectively.

1 17. A method of fabricating an angled tissue cutting instrument having a
2 flexible inner tubular member, comprising the steps of
3 forming a helical cut along a length portion of a solid wall elongate tubular body
4 to impart flexibility along the length portion;
5 applying a coating of adhesive over an outer surface of the tubular body along
6 the helically cut length portion;
7 positioning a heat shrinkable sleeve over the adhesively coated helically cut
8 length portion such that the length portion extends through the sleeve;
9 applying heat to shrink the sleeve diametrically over the length portion with the
10 adhesive bonding the sleeve to the tubular body; and
11 inserting the tubular body for rotation within an angled outer tubular member with
12 the length portion disposed within a bend of the outer tubular member to conform to the
13 configuration of the outer tubular member when the tubular body is rotated within the
14 outer tubular member to cut anatomical tissue via a cutting configuration connected
15 with a distal end of the tubular body and exposed from a cutting port of the outer tubular
16 member.

1 18. The method recited in claim 17 wherein said step of forming includes laser
2 cutting the helical cut in the tubular body in a stepped pattern.

3 19. The method recited in claim 18 wherein said step of forming includes
4 forming the helical cut at a helix angle in a first direction about a central longitudinal axis
5 of the tubular body.

1 20. The method recited in claim 19 wherein said step of forming includes
2 forming the helical cut at a helix angle of about 20° in a left hand direction about the
3 central longitudinal axis of the tubular body.

1 21. The method recited in claim 18 wherein said step of forming includes
2 forming the helical as repeating steps with the steps repeating at rotational intervals of
3 about 120° about a central longitudinal axis of the tubular body.

1 22. The method recited in claim 17 and further including, prior to said step of
2 applying, the step of positioning a mandrel within the lumen of the tubular body along
3 the helically cut length portion and, prior to said step of inserting, the step of removing
4 the mandrel from the tubular body.

1 23. The method recited in claim 17 wherein said step of applying a coating of
2 adhesive includes spraying the adhesive on the outer surface of the tubular body along
3 the helically cut length portion.

1 24. The method recited in claim 17 wherein said step of positioning includes
2 positioning the helically cut length portion to extend through a sleeve made of
3 fluorinated ethylene propylene.

1 25. The method recited in claim17 wherein said step of applying heat includes
2 applying heat by induction heating.

1 26. The method recited in claim 17 where said step of inserting includes
2 providing an irrigation channel between the inner tubular member and the outer tubular
3 member for the flow of irrigating fluid along the instrument.